IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application of

Applicant	:	Michael Donovan Mitchell et al.
Serial No.	:	10/705,174
Filed	:	November 11, 2003
Title	:	**WATER FILTER MATERIALS, WATER FILTERS AND KITS CONTAINING PARTICLES COATED WITH CATIONIC POLYMER AND PROCESSES FOR USING THE SAME**
Docket No.	:	8681RCR2
Examiner	:	Kim, Sun U
Art Unit	:	1797
Conf. No.	:	4650

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Commissioner for Patents
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Sir:

BRIEF ON APPEAL

This is an appeal from the Office Action mailed October 8, 2008, rejecting claims 1-6, 8, 9, 12-15 and 17-20, which are all of the claims in the application. On January 7, 2009 a Notice of Appeal with the accompanying fee was filed via facsimile. A Petition for a One-Month Extension of Time, and the fee required under 37 CFR §1.136, accompanies this paper providing for a timely submission up to and including April 7, 2009. A Credit Card Payment in the amount of $130.00 (extension fee under 37 CFR §1.136) and $540.00 (filing a brief in support of an appeal) also accompanies this paper in accordance with 37 CFR §41.20(b)(2).

I. Real Party in Interest

The real party in interest in this application is Pur Water Purification Products, Inc., by an assignment recorded in the files of the U.S. Patent and Trademark Office on December 22, 2006 under Reel 018668 and Frame 0431.

II. Related Appeals and Interferences

Applicants know of currently pending related appeals or interferences in Application Serial Nos. 10/643,669 and 10/705,572, both filed on April 7, 2009, that would directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal. The related appeals or interferences are currently pending, therefore, no decisions have been rendered by the Board in Application Serial Nos. 10/643,669 and 10/705,572.

III. Status of Claims

Claims 1-6, 8, 9, 12-15 and 17-20 are pending in this application; claims 7, 10, 11 and 16 were previously canceled without prejudice. Claims 1-6, 8, 9, 12-15 and 17-20 stand finally rejected and are before the Board for consideration on appeal. A copy of the appealed claims is found in the Appendix attached to this brief.

Applicants additionally note that the Office Action Summary, in the Disposition of Claims section, fails to indicate that claim 14 is pending and was finally rejected in the final Office Action of October 8, 2008. Applicants presume that this is simply a clerical error, as claim 14 has not been cancelled or otherwise withdrawn from pendency, and in fact, was rejected in paragraph 4 of that final Office Action.

IV. Status of Amendments

All of the amendments previously filed in this application have been entered.

V. Summary of Claimed Subject Matter

The following is a concise explanation of the subject matter defined in each of the independent claims and each of the dependent claims argued separately. Reference to the drawing figures and specifically depicted embodiments of the invention are for the convenience of the Board and are not to be interpreted as limitations on the claims.

In general, the claims relate to filters for providing potable water and kits that include filters for providing potable water. Embodiments of Applicants' invention are directed to novel

filter materials contained within the filter. Such filter materials provide improved microorganism removal from water in comparison to convention filters.

Claim 1

Independent claim 1 relates to "a filter for providing potable water," one embodiment of which is shown in Fig. 4 and discussed in the Specification beginning on page 29, line 9. The filter 20 comprises a housing 22 having an inlet 24 and an outlet 26 (see page 29, lines 10-11; Fig. 4) and a filter material 28 disposed within the housing 22 (see page 30, lines 22-25; Fig. 4). The filter material 28 is formed at least in part from a plurality of mesoporous wood activated carbon filter particles and particles selected from the group consisting of mesoporous wood activated carbon filter particles coated entirely with a cationic polymer, mesoporous wood activated carbon filter particles partially coated with a cationic polymer, and mixture thereof (see page 22, lines 7-10 and page 30, line 27 - page 31, line 3). The filter particles have a sum of mesopore and macropore volumes between about 0.2 mL/g and about 2 mL/g (see page 16, lines 20-24), wherein mesopore means an intra-particle pore having a diameter between 2 nm and 50 nm (see page 8, lines 11-13) and macropore means an intra-particle pore having a diameter greater than 50 nm (see page 8, lines 14-15). The filter particles have a total pore volume of greater than about 0.4 mL/g and less than about 3 mL/g (see page 16, lines 14-17). The filter particles have a ratio of the sum of the mesopore and macropore volumes to the total pore volume of greater than about 0.3 (see page 17, lines 13-15). The filter is operable to remove microorganisms from water flowing into the inlet and out of the outlet (see page 11, lines 9-17). The filter has a Filter Bacteria Log Removal of greater than about 2 logs and a Filter Viruses Log Removal of greater than about 1 log (see page 21, lines 4-13).

Claim 2

Claim 2 depends from claim 1 and relates to a cationic polymer selected from the group consisting of: polyvinylamine, poly(N-methylvinylamine), polyallylamine, polyallyldimethylamine, polydiallylmethylamine, polydiallyldimethylamine, polydiallyldimethylammonium chloride, polyvinylpyridinium chloride, poly(2-vinylpyridine),

poly(4-vinylpyridine), polyvinylimidazole, poly(4-aminomethylstyrene), poly(4-aminostyrene), polyvinyl(acrylamide-co-dimethylaminopropylacrylamide), polyvinyl(acrylamide-co-dimethyaminoethylmethacrylate), polyethyleneimine, polylysine, DAB-Am and PAMAM dendrimers, polyaminoamides, polyhexamethylenebiguandide, polydimethylamine-epichlorohydrine, aminopropyltriethoxysilane, N-(2-aminoethyl)-3-aminopropyltrimethoxysilane, N-trimethoxysilylpropyl-N, N, N-trimethylammonium chloride, bis(trimethoxysilylpropyl)amine, chitosan, grafted starch, the product of alkylation of polyethyleneimine by methylchloride, the product of alkylation of polyaminoamides with epichlorohydrine, cationic polyacrylamide with cationic monomers, dimethyl aminoethyl acrylate methyl chloride (AETAC), dimethyl aminoethyl methacrylate methyl chloride (METAC), acrylamidopropyl trimethyl ammonium chloride (APTAC), methacryl amodopropyl trimethyl ammonium chloride (MAPTAC), diallyl dimethyl ammonium chloride (DADMAC), ionenes, silanes and mixtures thereof (see page 26, line 12 - page 27, line 12).

Claim 3

Claim 3 depends from claim 1 and relates to a cationic polymer is selected from the group consisting of: polyaminoamides, polyethyleneimine, polyvinylamine, polydiallyldimethylammonium chloride, polydimethylamine-epichlorohydrin, polyhexamethylenebiguanide, and poly-[2-(2-ethoxy)-ethoxyethlyl-guanidinium] chloride (see page 27, lines 13-16).

Claim 4

Claim 4 depends from claim 1 and relates to mesoporous wood activated carbon filter particles, mesoporous wood activated carbon filter particles coated entirely with a cationic polymer, and mesoporous wood activated carbon filter particles partially coated with a cationic polymer that are further coated with silver or a silver containing material (see page 22, lines 7-10 and page 30, line 27 - page 31, line 3).

Claim 5

Claim 5 depends from claim 1 and relates to a plurality of mesoporous wood activated carbon filter particles that have a sum of the mesopore and macropore volumes between about 0.4 mL/g and about 1 mL/g (see page 16, lines 20-24).

Claim 6

Claim 6 depends from claim 1 and relates to a plurality of mesoporous wood activated carbon filter particles that have a Bacteria Removal Index of greater than about 99% and a Viruses Removal Index of greater than about 90% (see page 18, lines 5-12).

Claim 8

Claim 8 depends from claim 1 and relates to the filter material having a single-collector efficiency, η, of between about 0.005 and 0.25, and a filter coefficient, λ, between about 40 m^{-1} and about 14,000 m^{-1} (see page 20, line 20 - page 21, line 3).

Claim 9

Claim 9 depends from claim 1 and relates to the plurality of mesoporous wood activated carbon filter particles being basic (see page 13, line 9), have a point of zero charge between about 9 and about 12 (see page 13, lines 18-21), and an Oxidation Reduction Potential between about 290 mV and about 175 mV (see page 14, lines 1-4).

Claim 12

Claim 12 depends from claim 1 and relates to "a kit" comprising the filter according to claim 1 and a package for containing the filter, which is discussed on page 41, lines 6-9. Either the package or the filter housing comprises information that the filter or filter material provides bacterial removal, virus removal, microbial removal, killing of bacteria, killing of viruses, killing of microbials, or any combination of these, which is discussed on page 41, lines 1-12.

Claim 13

Claim 13 depends from claim 15 and relates to "a kit" comprising the filter according to claim 15 and a package for containing the filter (see page 41, lines 6-9). Either the package or the filter housing comprises information that the filter or filter material provides bacterial removal, virus removal, microbial removal, killing of bacteria, killing of viruses, killing of microbials, or any combination of these (see page 41, lines 1-12).

Claim 14

Claim 14 depends from claim 4 and relates to a cationic polymer selected from the group consisting of: polyaminoamides, polyethyleneimine, polyvinylamine, polydiallyldimethylammonium chloride, polydimethylamine-epichlorohydrin, polyhexamethylenebiguanide, and poly-[2-(2-ethoxy)-ethoxyethlyl-guanidinium] chloride (see page 27, lines 13-16).

Claim 15

Claim 15 depends from claim 1 and relates to a filter material disposed within the housing that further comprises a binder binding the plurality of mesoporous activated carbon filter particles (see page 31, line 25 - page 32, line 1).

Claim 17

Claim 17 depends from claim 3 and relates to a cationic polymer comprising polydiallyldimethyl-ammonium chloride [poly-DADMAC] (see page 27, lines 7-11).

Claim 18

Claim 18 depends from claim 1 and relates to a filter having a Filter Bacteria Removal of greater than about 6 logs, and a Filter Viruses Removal of greater than about 4 logs (see page 21, lines 4-13).

Claim 19

Claim 19 depends from claim 1 and relates to a filter having a single-collector efficiency, η, of greater than about 0.002 (see page 20, line 20 - page 21, line 3).

Claim 20

Claim 20 depends from claim 1 and relates to filter particles having a pore volume of at least 0.03 mL/g for pore diameters between about 4 nm and about 6 nm (see page 17, lines 2-4).

VI. Grounds of Rejection to be Reviewed on Appeal

The grounds of rejection for review on appeal are:

(1) Claims 1-3, 5-6, 8-9 and 17-20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Cannon et al. (US 6,881,348) in view of Derbyshire et al. (US 6,057,262) and Hill (US 1,782,850);

(2) Claims 4 and 14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Cannon et al. (US 6,881,348) in view of Derbyshire et al. (US 6,057,262) and Hill (US 1,782,850) as applied to claim 1, and further in view of Koslow (US 6,630,016);

(3) Claim 12 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Cannon et al. (US 6,881,348) in view of Derbyshire et al. (US 6,057,262) and Hill (US 1,782,850) as applied to claim 1, and further in view of Jagtoyen et al. (US 2004/0040906);

(4) Claim 15 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Cannon et al. (US 6,881,348) in view of Hill (US 1,782,850) and Koslow (US 6,630,016); and

(5) Claim 13 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Cannon et al. (US 6,881,348) in view of Hill (US 1,782,850) and Koslow (US 6,630,016) as applied to claim 15, and further in view of Jagtoyen et al. (US 2004/0040906).

VII. Argument

Applicants submit that the filter for providing potable water defined by independent claim 1 and claims 2-6, 8, 9, 12-15 and 17-20 dependent thereon are nonobvious over and patentably distinguishable from the references cited by the Examiner. Accordingly, the rejections under 35 U.S.C. §103(a) should be reversed, and favorable action by the Board is respectfully requested.

A. Rejections under 35 USC § 103(a)

In general, to establish a prima facie case of obviousness, the Examiner must show, by reasoning or evidence, one or more of the following rationales: (A) Combining prior art elements according to known methods to yield predictable results; (B) Simple substitution of one known element for another to obtain predictable results; (C) Use of known technique to improve similar devices (methods, or products) in the same way; (D) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results; (E) "Obvious to try" - choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; (F) Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art; or (G) Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention. See MPEP §2143 and *KSR International Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 167 L.Ed.2d 705, 82 USPQ2d 1385 (2007). The Examiner has failed to establish any of the rationales set forth above to support the conclusion of obviousness.

A rejection based on §103 clearly must rest on a factual basis, and these facts must be interpreted without hindsight reconstruction of the invention from the prior art. *In re Warner*, 154 USPQ 173, 178 (CCPA 1967). The Examiner may *not*, because he may doubt that the invention is patentable, resort to speculation, unfounded assumptions, or hindsight reconstruction to supply deficiencies in his required factual basis. *Id.*

1. Rejection under 35 USC § 103(a) over Cannon et al. (US 6,881,348) in view of Derbyshire et al. (US 6,057,262) and Hill (US 1,782,850)

a.) Claim 1 as represenative of claims 2, 3, 5-6, 8-9 and 17-20

In the final Office Action of October 8, 2008, the Examiner rejected claims 1-3, 5, 6, 8, 9 and 17-20 under 35 USC §103(a) as unpatentable over Cannon et al. in view of Derbyshire et al. and Hill. This rejection was clearly based on the Examiner's incorrect and unsupported assertion that the prior art references teach a filter for providing potable water that includes mesoporous wood activated carbon particles. Applicants controvert this rejection for the reasons set forth below.

In that final Office Action, the Examiner asserted that Cannon et al. teaches a column, i.e. "a housing", having an inlet and an outlet and a filter material disposed in the column comprising a plurality of mesoporous activated carbon filter particles loaded with a cationic polymer. Further, the Examiner asserted that the characterization of mesoporous carbon by the claimed sum of the mesopore and macropore volumes of the filter particles, the claimed total pore volume of the filter particles, and the claimed ratio of the sum of the mesopore and macropore volumes of the filter particles to the total pore volume are inherent in the mesoporous carbon of Cannon et al. by its mesoporosity.

However, Applicants assert that Cannon et al. provides no teachings of macropores. As defined in the Applicants' specification, the "sum of the mesopore and macropore volumes" is equal to the difference between the total pore volume and the micropore volume (page 8, lines 25-30). Thus, as defined in the specification, the mesoporous activated carbon filter particles require a blend of macropores, mesopores, and micropores. Cannon et al. provide teachings regarding mesopore volume and micropore volume (col. 8, lines 4-8; col. 9, lines 29-32); however, Cannon et al. provide no teaching of macropores as required in claim 1. By failing to teach macropores, Cannon et al. consequently also fail to teach that the sum of the mesopore and macropore volumes of said filter particles is between about 0.2 mL/g and about 2 mL/g, wherein mesopore means an intra-particle pore having a diameter between 2 nm and 50nm, and

macropore means an intra-particle pore having a diameter greater than 50nm, as required in claim 1.

In fact, the Examiner acknowledges that Cannon et al. fail to teach that the sum of the mesopore and macropore volumes of said filter particles is between about 0.2 mL/g and about 2 mL/g; nevertheless, the Examiner asserts that this teaching is inherent in view of Cannon et al.'s alleged disclosure of "mesoporosity." However, to establish a prima facie case of obviousness based on inherency, the prior art products must be identical or substantially identical to the claimed structure. *In re Best*, 562 F.2d 1252, 1255, 195 U.S.P.Q. 430, 433 (CCPA 1977). As stated above, Cannon et al. fail to teach mesoporous activated carbon filter particles comprising macropores. By failing to teach this structural component, activated carbon structure taught by Cannon et al. is not identical or substantially identical to the claimed activated carbon structure, and therefore, the Examiner has failed to establish a prima facie case of obviousness based on inherency. Absent an impermissible hindsight reconstruction of the present disclosure and claims, it stands to reason that Cannon et al. cannot inherently teach that that the sum of the mesopore and macropore volumes of said filter particles is between about 0.2 mL/g and about 2 mL/g, when Cannon et al. does not minimally teach macropores.

Moreover, on page 2 of the final Office Action, the Examiner acknowledged that Cannon et al. does not teach mesoporous wood activated carbon filter particles for bacteria and virus removal. The Examiner then cited Derbyshire for the teaching of mesoporous granular activated carbon (GAC) particles made from wood etc., wherein the mesoporous carbon is used for adsorption of large molecules taking advantage of relatively high pore surface area for increased adsorption activity. The Examiner also cited Hill for the teaching that bacteria are removed from water by activated carbon. The Examiner further asserted that the mesoporous activated carbon particles of Derbyshire et al. in a column have the inherent capabilities of the claimed F-BLR and F-VLR by the sheer mesoporosity of activated carbon.

The reasons given by the Examiner in the final rejection for combining the reference teachings mischaracterize the nature of the references to facilitate their combination. The combination of Cannon et al., Derbyshire et al. and Hill is made possible only through impermissible hindsight review of the references, and a self-serving interpretation of their

disclosures. That is, the Examiner has effectively used Applicants' claims as a blueprint for the proposed combination. However, the Examiner is not entitled to use a claim as a shopping list of elements which are to be located in diverse prior art references and then combined with no reason.

The invention itself, as delineated in the claims, may not be used as a template to find separate, individual elements in the prior art, and then to combine the elements and pronounce the combination obvious. The United States Supreme Court addressed the proper standards to combine references under 35 U.S.C. 103 in *KSR International Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 167 L.Ed.2d 705, 82 USPQ2d 1385 (2007). The Court, while disapproving a strict application of the Federal Circuit's "TSM" (teaching, suggestion or motivation) test for determining whether it would have been obvious to combine references under 35 U.S.C. §103, adopted an objective standard in which all of the facts and circumstances associated with the invention and the prior art are considered. In point of fact, the Supreme Court cited with approval Federal Circuit cases adopting a more flexible TSM standard, and reaffirmed the standards for obviousness set out in *Graham v. John Deere*, 383 U.S. 1, 148 USPQ 459 (1966). Judged in this light, the claimed invention cannot be said to be an obvious combination of the teachings of the references.

Nonetheless, the Examiner concluded on page 3 of the October 8, 2008 final Office Action that simple substitution of mesoporous wood activated carbon filter particles for mesoporous bituminous or lignite GAC particles would achieve the predictable result of removing large molecules by virtue of equivalent mesoporous carbon having relatively high pore surface area as disclosed in Derbyshire et al. as well as providing a capability to remove bacteria from water as taught by Hill.

However, Cannon et al.'s deficiency is not remedied by Derbyshire et al. or Hill, either alone or in combination. Derbyshire et al. discloses processes for activating carbon and processes for using the same. Derbyshire et al. teaches that "[A]ctivated carbons may be utilized in various applications to treat waste water, to recover solvents from process streams, to purify air and gases, to reduce gasoline vapor omissions and in gold recovery (col. 1, lines 19-22)" and "...mesoporous carbons are used for the adsorption of large molecules such as color bodies (col.

1, lines 32-36, emphasis added)." Nowhere does Derbyshire teach or suggest, as recited in Applicants' claims, a filter comprising, among other things, a filter operable to remove microorganisms, as recited in Applicants' claims. The Applicants' claims specifically disclose a filter that has a Filter Bacteria Log Removal of greater than about 2 logs and a Filter Viruses Log Removal of greater than about 1 log. Filter Bacteria Log Removal capability and Filter Viruses Log Removal capability are specifically defined on pages 7-8 of the specification. Derbyshire et al. do not teach this specifically defined Filter Bacteria Log Removal capability and/or specific Filter Viruses Log Removal capability.

Hill discloses a method comprising stirring a suspension of activated carbon in water by "giv[ing] the body of liquid in the settling vessel a slow rotational movement, say, of the order of one or two turns per hour" (col. 2, lines 98-100). Although Hill states that carbon, while lacking bactericidal properties, is able to remove bacteria (col. 2, lines 56-58), Hill goes on to say that because of the difficulty in freeing water of added carbon, the use of carbon remains impracticable (col. 2, lines 60-73). Hill attempts to address this implacability with the disclosed stirring technique. However, Hill is void of any mention, teaching, suggestion, or motivation to provide a filter material formed at least in part from a plurality of mesoporous wood activated carbon filter particles and particles selected from the group consisting of mesoporous wood activated carbon filter particles coated entirely with a cationic polymer, mesoporous wood activated carbon filter particles partially coated with a cationic polymer, and mixtures thereof, wherein the filter is operable to remove microorganisms, as recited in Applicants' claims. Moreover, Hill does not teach the specifically defined Filter Bacteria Log Removal and/or the specific Filter Viruses Log Removal as claimed by the Applicants.

Applicants submit that they have surprisingly found that mesoporous wood activated carbon, as claimed, is useful in the removal of bacteria and viruses from water. Applicants demonstrate this, e.g. in the results shown in Figures 7a and 7b, where the performance of a filter according to the invention (mesoporous RGC) is compared to that of a conventional filter (containing coconut microporous activated carbon particles). As can be seen in Fig. 7a, the inventive filter is effective in removing *E. coil* for about 240 L of cumulative water volume, whereas the conventional filter fails at less than 40 L. As can be seen in Fig. 7b, the inventive

filter is effective in removing MS-2 for about 80 to 100 L of cumulative water volume, whereas the conventional filter fails at less than 20 L. As the Supreme Court stated in *KSR International Co. v. Teleflex Inc.*, the fact that elements work together in an unexpected and fruitful manner supports the conclusion that a combination is not obvious to those skilled in the art.. 127 S. Ct. 1727, 82 U.S.P.Q. 2d 1385 (2007). Due to the unexpected results achieved by the claimed water filter device of claim 1, Applicants further assert that the claimed water filter device is nonobvious over the cited references.

Furthermore, because those results show that filters utilizing different activated carbon sources may provide wildly differing filtration properties and efficiencies, there would be no reasonable expectation of success (in effectively removing microorganisms from water) by substituting mesoporous wood activated carbon particles for the mesoporous bituminous or lignite GAC particles of the filter of Cannon et al. Moreover, there would certainly be no reasonable expectation of success in providing a filter with the properties of a Filter Bacteria Log Removal of greater than about 2 logs and a Filter Viruses Log Removal of greater than about 1 log, as recited by the claims. As previously stated, Cannon et al. and Derbyshire et al. do not teach the removal of microorganisms from water. Consequently, even in view of the teachings of Hill, one skilled in the art would not consider it obvious to utilize the mesoporous granular wood activated carbon particles of Derbyshire et al. within the filter of Cannon et al. to provide the specific claimed microorganism filtration properties.

Applicants therefore submit that the Examiner is wrong in the assertion that a "simple substitution" of mesoporous wood activated carbon particles for mesoporous bituminous or lignite GAC particles would achieve the predictable result of removing large molecules by virtue of equivalent mesoporous carbon. As demonstrated by Applicants, all types of activated carbons are not similar, and cannot simply be interchanged with a reasonable expectation of success. Applicants' claims particularly point out and distinctly claim certain activated carbons for use in filter material to remove bacteria and viruses, as well as specific microorganism filtration properties.

Therefore, Applicants submit that the Examiner has failed to establish a *prima facie* case of obviousness by failing to provide the required evidence and reasoning to combine the

reference teachings in the manner proposed. Even if combined, the reference teachings still fail to teach the subject matter recited in claims 2, 3, 5-6, 8-9 and 17-20.

2. Rejection under 35 USC § 103(a) over Cannon et al. (US 6,881,348) in view of Derbyshire et al. (US 6,057,262) and Hill (US 1,782,850) as applied to claim 1, and further in view of Koslow (US 6,630,016)

In the final Office Action of October 8, 2008, the Examiner rejected claims 4 and 14 under 35 USC §103(a) as unpatentable over the Base References (Cannon et al., Derbyshire et al. and Hill) in further view of Koslow. This rejection was clearly based on the Examiner's incorrect and unsupported assertion that the prior art references teach a filter utilizing mesoporous wood activated carbon particles (as detailed above). Accordingly, Applicants renew their arguments above as they relates to the Base References.

Koslow was narrowly cited for the teaching of a filter comprising a silver, effective biocide, coated or precipitated onto the filter particles coated with cationic polymers. However, Koslow does not teach, for example, a filter comprising a mesoporous wood activated carbon filter material. As a result, Applicants submit that deficiencies of the Base References are not remedied by the teachings of Koslow, and that claims 4 and 14 are non-obvious, at least by virtue of directly claiming or depending on a claim that recites a filter comprising, among other things, a filter material formed at least in part from a plurality of mesoporous wood activated carbon filter particles and particles selected from the group consisting of mesoporous wood activated carbon filter particles coated entirely with a cationic polymer, mesoporous wood activated carbon filter particles partially coated with a cationic polymer, and mixtures thereof, where the sum of the mesopore and macropore volumes of the filter particles is between about 0.2 mL/g and 2 mL/g; wherein mesopore means an intra-particle pore having a diameter between 2 nm and 50 nm, and macropore means an intra-particle pore having a diameter greater than 50 nm, wherein the filter is operable to remove microorganisms, and wherein the filter that has a Filter Bacteria Log Removal of greater than about 2 logs and a Filter Viruses Log Removal of greater than about 1 log.

3. Rejection under 35 USC § 103(a) over Cannon et al. (US 6,881,348) in view of Derbyshire et al. (US 6,057,262) and Hill (US 1,782,850) as applied to claim 1, and further in view of Jagtoyen et al. (US 2004/0040906)

In the final Office Action of October 8, 2008, the Examiner rejected claim 12 under 35 USC §103(a) as unpatentable over the Base References (Cannon et al., Derbyshire et al. and Hill) in further view of Jagtoyen et al. This rejection was clearly based on the Examiner's incorrect and unsupported assertion that the prior art references teach a filter utilizing mesoporous wood activated carbon particles (as detailed above). Accordingly, Applicants renew their arguments above as they relates to the Base References.

Jagtoyen et al. was narrowly cited for the teaching of a package for containing the filter comprising a housing containing a filter material of activated carbon and information that describes the use of the filter for removal of pathogens, particularly viruses. However, Jagtoyen et al. do not teach a filter comprising a filter comprising a mesoporous wood activated carbon filter material. As a result, Applicants further submit that deficiencies of the Base References are not remedied by the teachings of Jagtoyen et al., and that claim 12 is non-obvious, at least by virtue of directly claiming or depending on a claim that recites a filter comprising, among other things, a filter material formed at least in part from a plurality of mesoporous wood activated carbon filter particles and particles selected from the group consisting of mesoporous wood activated carbon filter particles coated entirely with a cationic polymer, mesoporous wood activated carbon filter particles partially coated with a cationic polymer, and mixtures thereof, where the sum of the mesopore and macropore volumes of the filter particles is between about 0.2 mL/g and 2 mL/g; wherein mesopore means an intra-particle pore having a diameter between 2 nm and 50 nm, and macropore means an intra-particle pore having a diameter greater than 50 nm, wherein the filter is operable to remove microorganisms, and wherein the filter that has a Filter Bacteria Log Removal of greater than about 2 logs and a Filter Viruses Log Removal of greater than about 1 log.

4. Rejection under 35 USC § 103(a) over Cannon et al. (US 6,881,348) in view of Hill (US 1,782,850) and Koslow (US 6,630,016)

In the final Office Action of October 8, 2008, the Examiner rejected claim 15 under 35 USC §103(a) as unpatentable over Cannon et al. in view of Hill and Koslow. This rejection did not take into account that Cannon et al., Hill and Koslow do not teach filter utilizing mesoporous wood activated carbon particles (as detailed above). Thus, Applicants renew their arguments as stated above. As demonstrated by Applicants, all types of activated carbons are not similar, and cannot simply be interchanged with a reasonable expectation of success. Applicants' claims particularly point out and distinctly claim certain activated carbons for use in filter material to remove bacteria and viruses. Accordingly, claim 15 is non-obvious, at least by virtue of directly claiming or depending on a claim that recites a filter comprising, among other things, a filter material formed at least in part from a plurality of mesoporous wood activated carbon filter particles and particles selected from the group consisting of mesoporous wood activated carbon filter particles coated entirely with a cationic polymer, mesoporous wood activated carbon filter particles partially coated with a cationic polymer, and mixtures thereof, where the sum of the mesopore and macropore volumes of the filter particles is between about 0.2 mL/g and 2 mL/g; wherein mesopore means an intra-particle pore having a diameter between 2 nm and 50 nm, and macropore means an intra-particle pore having a diameter greater than 50 nm, wherein the filter is operable to remove microorganisms, and wherein the filter that has a Filter Bacteria Log Removal of greater than about 2 logs and a Filter Viruses Log Removal of greater than about 1 log.

5. Rejection under 35 USC § 103(a) over Cannon et al. (US 6,881,348) in view of Hill (US 1,782,850) and Koslow (US 6,630,016) as applied to claim 15, and further in view of Jagtoyen et al. (US 2004/0040906)

In the final Office Action of October 8, 2008, the Examiner rejected claim 13 under 35 USC §103(a) as unpatentable over the Cannon et al. in view of Hill and Koslow as applied to claim 15 above, and further in view of Jagtoyen et al. As with the rejection of claim 15, this rejection does not take into account that Cannon et al., Hill and Koslow do not teach a filter utilizing mesoporous wood activated carbon particles (as detailed above). Further, Jagtoyen et al. also does not teach a filter utilizing mesoporous wood activated carbon particles. Thus, Applicants renew their arguments as stated above. As demonstrated by Applicants, all types of activated carbons are not similar, and cannot simply be interchanged with a reasonable expectation of success. Applicants' claims particularly point out and distinctly claim certain activated carbons for use in filter material to remove bacteria and viruses. Accordingly, claim13 is non-obvious, at least by virtue of their directly claiming or depending on a claim that recites a filter comprising, among other things, a filter material formed at least in part from a plurality of mesoporous wood activated carbon filter particles and particles selected from the group consisting of mesoporous wood activated carbon filter particles coated entirely with a cationic polymer, mesoporous wood activated carbon filter particles partially coated with a cationic polymer, and mixtures thereof, where the sum of the mesopore and macropore volumes of the filter particles is between about 0.2 mL/g and 2 mL/g; wherein mesopore means an intra-particle pore having a diameter between 2 nm and 50 nm, and macropore means an intra-particle pore having a diameter greater than 50 nm, wherein the filter is operable to remove microorganisms, and wherein the filter that has a Filter Bacteria Log Removal of greater than about 2 logs and a Filter Viruses Log Removal of greater than about 1 log.

VIII. Conclusion

Applicants respectfully submit that there are clear errors in the rejections to claims 1-6, 8, 9, 12-15 and 17-20 maintained from the previous final Office Action dated October 8, 2008, and that essential elements to establish a *prima facie* case of obviousness have not been met. In particular, as discussed in detail above, the cited references do not disclose all the limitations in the rejected claims.

Therefore, it is submitted that the claims pending in the instant application are allowable. The Board is respectfully requested to reverse all the rejections made by the Examiner in their entirety.

Respectfully submitted,

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AJM/AMM

CLAIMS APPENDIX

1. A filter for providing potable water, comprising:

(a) a housing having an inlet and an outlet; and

(b) a filter material disposed within said housing formed at least in part from a plurality of mesoporous wood activated carbon filter particles and particles selected from the group consisting of mesoporous wood activated carbon filter particles coated entirely with a cationic polymer, mesoporous wood activated carbon filter particles partially coated with a cationic polymer, and mixtures thereof, wherein:

(i) the sum of the mesopore and macropore volumes of said filter particles is between about 0.2 mL/g and about 2 mL/g; wherein mesopore means an intra-particle pore having a diameter between 2 nm and 50 nm, and macropore means an intra-particle pore having a diameter greater than 50 nm;

(ii) the total pore volume of said filter particles is greater than about 0.4 mL/g and less than about 3 mL/g; and

(iii) the ratio of the sum of the mesopore and macropore volumes to the total pore volume of said filter particles is greater than about 0.3;

wherein said filter is operable to remove microorganisms from water flowing into said inlet and out of said outlet; and

wherein the filter has a Filter Bacteria Log Removal of greater than about 2 logs and a Filter Viruses Log Removal of greater than about 1 log.

2. The filter of claim 1, wherein the cationic polymer is selected from the group consisting of: polyvinylamine, poly(N-methylvinylamine), polyallylamine, polyallyldimethylamine, polydiallylmethylamine, polydiallyldimethylamine, polydiallyldimethylammonium chloride, polyvinylpyridinium chloride, poly(2-vinylpyridine), poly(4-vinylpyridine),

polyvinylimidazole, poly(4-aminomethylstyrene), poly(4-aminostyrene), polyvinyl(acrylamide-co-dimethylaminopropylacrylamide), polyvinyl(acrylamide-co-dimethyaminoethylmethacrylate), polyethyleneimine, polylysine, DAB-Am and PAMAM dendrimers, polyaminoamides, polyhexamethylenebiguandide, polydimethylamine-epichlorohydrine, aminopropyltriethoxysilane, N-(2-aminoethyl)-3-aminopropyltrimethoxysilane, N-trimethoxysilylpropyl-N, N, N-trimethylammonium chloride, bis(trimethoxysilylpropyl)amine, chitosan, grafted starch, the product of alkylation of polyethyleneimine by methylchloride, the product of alkylation of polyaminoamides with epichlorohydrine, cationic polyacrylamide with cationic monomers, dimethyl aminoethyl acrylate methyl chloride (AETAC), dimethyl aminoethyl methacrylate methyl chloride (METAC), acrylamidopropyl trimethyl ammonium chloride (APTAC), methacryl amodopropyl trimethyl ammonium chloride (MAPTAC), diallyl dimethyl ammonium chloride (DADMAC), ionenes, silanes and mixtures thereof.

3. The filter of claim 1, wherein the cationic polymer is selected from the group consisting of: polyaminoamides, polyethyleneimine, polyvinylamine, polydiallyldimethylammonium chloride, polydimethylamine-epichlorohydrin, polyhexamethylenebiguanide, and poly-[2-(2-ethoxy)-ethoxyethlyl-guanidinium] chloride.

4. The filter of claim 1, wherein at least a portion of the mesoporous wood activated carbon filter particles, the mesoporous wood activated carbon filter particles coated entirely with a cationic polymer, or the mesoporous wood activated carbon filter particles partially coated with a cationic polymer are further coated with silver or a silver containing material.

5. The filter of claim 1, wherein the sum of the mesopore and the macropore volumes of said plurality of mesoporous wood activated carbon filter particles is between about 0.4 mL/g and about 1 mL/g.

6. The filter of claim 1, wherein said plurality of mesoporous wood activated carbon filter particles has a Bacteria Removal Index of greater than about 99% and a-Viruses Removal Index of greater than about 90%.

8. The filter of claim 1, wherein said filter material has a single-collector efficiency, η, of between about 0.005 and 0.25, and a filter coefficient, λ, between about 40 m^{-1} and about 14,000 m^{-1}.

9. The filter of claim 1, wherein said plurality of mesoporous wood activated carbon filter particles are basic, have a point of zero charge between about 9 and about 12, and an Oxidation Reduction Potential between about 290 mV and about 175 mV.

12. A kit comprising:

i) a filter to claim 1; and

ii) a package for containing the filter;

wherein either the package or the filter housing comprises information that the filter or filter material provides: bacterial removal; virus removal; microbial removal; killing of bacteria, killing of viruses, killing of microbials, or any combination of these.

13. A kit comprising:

i) a filter according to claim 15; and

ii) package for containing the filter;

wherein either the package or the filter housing comprises information that the filter or filter material provides: bacterial removal; virus removal; microbial removal; killing of bacteria, killing of viruses, killing of microbials, or any combination of these.

14. The filter of claim 4 wherein the cationic polymer is selected from the group consisting of: polyaminoamides, polyethyleneimine, polyvinylamine,

polydiallyldimethylammonium chloride, polydimethylamine-epichlorohydrin, polyhexamethylenebiguanide, and poly-[2-(2-ethoxy)-ethoxyethlyl-guanidinium] chloride.

15. The filter of claim 1, wherein the filter material disposed within said housing further comprises a binder binding the plurality of mesoporous activated carbon filter particles.

17. The filter of claim 3, wherein the cationic polymer is polydiallyldimethyl-ammonium chloride [poly-DADMAC].

18. The filter of claim 1, wherein the filter has a Filter Bacteria Removal of greater than about 6 logs, and a Filter Viruses Removal of greater than about 4 logs.

19. The filter of claim 1, wherein the filter has a single-collector efficiency, η, of greater than about 0.002.

20. The filter of claim 1, wherein the pore volume is at least 0.03 mL/g for pore diameters between about 4 nm and about 6 nm.

EVIDENCE APPENDIX

NONE

RELATED PROCEEDINGS APPENDIX

Applicants know of currently pending related appeals or interferences in Application Serial Nos. 10/643,669 and 10/705,572 that would directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal. The related appeals or interferences are currently pending, therefore, no decisions have been rendered by the Board in Application Serial Nos. 10/643,669 and 10/705,572.